

Amendment under 37 CFR 1.111
Application No. 09/811,389
August 21, 2002

REMARKS

By this amendment, claim 1 and 11 have been amended and new claims 21-24 have been added to the application. Currently, claims 1-24 are pending in the application.

The title was objected to by the Examiner. The title has been amended to recite "Laser Beam Scanner Having an Optical Path Adjustment System". It is respectfully requested that the Examiner approve this title or suggest a new title that is acceptable.

Claims 1-20 were rejected under 35 USC 112, second paragraph, as being definite. Regarding claim 1, the Examiner stated that the following limitation "at least an adjuster for adjusting an optical path of a laser beam corresponding to the adjuster" at lines 9-10 is unclear in that the adjustment of the optical path of the laser beam by the adjuster appears to be based on the adjuster itself but not on the feedback information provided by the position detector.

The Examiner similarly stated that the limitation "at least an adjuster for adjusting an optical path of a laser beam corresponding to the adjuster" at lines 13-14 of claim 11 was also unclear. By this amendment, the claims 1 and 11 have been amended to remove the phrase "corresponding to the adjuster".

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This amendment is being made to correct an informality in the claims and is not being done to overcome any prior art references. In view of this amendment to the claims, it is respectfully requested that this rejection be withdrawn.

Claims 1-3, 11-13, 7-9 and 17-19 were rejected under 35 USC 103(a) as being obvious over Yeadon et al. (U.S. Patent No. 4,490,608) in view of Minoura et al. (U.S. Patent No. 5,627,670). The Examiner believed that Yeadon et al. discloses an optical scanning apparatus having two laser light sources (1 and 4) for oscillating and emitting at least two laser beams having different wavelengths (blue laser light source 1 and red laser light source 4), an optical scanning system (polygon mirror 8 and scanning lens 9) for scanning the laser beams on a predetermined scanning plane (scanning plane formed by the surface of the photosensitive medium 10), an optical paths adjusting system (5) for adjusting optical paths of the optical scanning system, including a position sensor (photodetectors 16 and 17) and an adjuster (compensating deflector 5) for adjusting the optical path of each of the laser beams.

The Examiner also stated that Yeadon et al. failed to explicitly teach the position sensor being disposed on a plane optically conjugated with the predetermined scanning plane and the total reflection mirror. The Examiner relied on Minoura et

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al. for this feature. This rejection is respectfully traversed in view of the amendments to the claims and the following remarks.

The present invention relates to providing a laser beam scanner and a photographic printer using the scanner, wherein the optical paths of the laser beams can be adjusted without using measuring instrument disposed on a scanning line on which the laser beams are to be scanned. The present invention comprises at least two laser light sources for oscillating and emitting at least two laser beams having different wavelengths, an optical scanning system for scanning the laser beams on a predetermined scanning plane, and an optical paths adjusting system for adjusting optical paths of the optical scanning system. The optical paths adjusting system includes a position sensor disposed on a plane optically conjugated with the predetermined scanning plane, and at least two adjusters for adjusting optical path of respective laser beams corresponding to each adjuster. As a result, at least two optical paths of the laser beams can be adjusted so as to overlap the scanning lines of the laser beams with each other.

Claim 1, and similarly claim 11, have been amended to recite that an optical path adjusting system for adjusting optical paths of the optical scanning system, includes a position sensor

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disposed on a plane optically conjugated with the predetermined scanning plane, and "a first adjuster for adjusting an optical path of said first laser beam and a second adjuster for adjusting an optical path of said second laser beam". This feature relates to the adjustable mirror 110. This feature is not shown or suggested by Yeadon et al. or Minoura et al.

Yeadon et al. disclose a flying spot scanner that is used to expose a photosensitive surface to an intensity modulated beam of light to build up an image on a photosensitive surface. Such a scanner includes a position sensor comprising an elongate grating (14) and means to take part of the beam of light from the scanning head (8) of the flying spot scanner and apply it to the grating (14) so that it scans in a direction along the grating. The rulings of the grating form an oblique angle with the direction of scanning of the part of the beam of light. A photodetector (17) is arranged to monitor the interaction of part of the beam of light with the grating. Means (13, 16) are provided to produce a signal representative of the position of the beam of light in its direction of scanning, and a means (20) is provided to mix the output signal from the photodetector (17) with the signal representative of the position of the part of the beam of light to provide a phase modulated output signal. The phase modulation of which gives an indication of the

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position of the scanning beam of light in a direction transverse to its scanning direction. Yeadon et al. disclose that preferably the means to produce a signal representative of the position of the beam in its direction of scanning includes a second grating (13) and photodetector (16). However, Yeadon et al. does not disclose or suggest a first adjuster for adjusting an optical path of said first laser beam and a second adjuster for adjusting an optical path of said second laser beam.

Minoura et al. does not make up for the deficiencies in Yeadon et al. Minoura et al. disclose a scanning optical apparatus comprising a light source unit, scanning means for deflecting a beam from said light source unit and scanning a scanning surface with the beam, means for detecting the beam scanned on the scanning surface and a control means for controlling the beam scanned on the scanning surface in a direction perpendicular to the scanning surface on the basis of a magnitude and a change as a function of time of a signal output from the detecting means. Minoura et al. also disclose a scanning optical apparatus for detecting a focusing position of a beam spot in a direction perpendicular to a scanning surface formed by a scanning beam as a function of time.

Minoura et al. disclose a scanning optical apparatus comprising a light source unit 1 constituted by a semiconductor

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laser and a collimator lens, a spot position control system 2, a rotary polygonal mirror 3, a motor 4 for driving the polygonal mirror 3, a scanning lens system 5, a photosensitive drum 6, a spot position detector 7, a detection signal processing circuit 8 for processing electrical signals from the spot position detector 7, and a control circuit 9 for supplying a control signal to the spot position control system 2 in accordance with a signal output from the detection signal processing circuit 8. However, Minoura et al. do not disclose or suggest a first adjuster for adjusting an optical path of said first laser beam and a second adjuster for adjusting an optical path of said second laser beam.

It is therefore respectfully submitted that both Yeadon et al. and Minoura et al. do not disclose or suggest the presently claimed invention and it would not have been obvious to one of ordinary skill in the art to combine these references to render the present claims obvious. Accordingly, claims 1 and 11 clearly define over the prior art of record and should be allowed.

Dependent claims 4 and 14 were rejected under 35 USC 103(a) as being obvious over Yeadon et al. in view of Minoura et al. and further in view of Uemura et al. (U.S. Patent No. 5,436,645). Further, dependent claims 5-6 and 15-16 were rejected under 35 USC 103(a) as being obvious over Yeadon et al. in view of Minoura et al. and further in view of Ackerman (U.S. Patent No.

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4,560,244). Additionally, dependent claims 10 and 20 were rejected under 35 USC 103(a) as being obvious over Yeadon et al. in view of Minoura et al. and further in view of Suzuki (JP 2-236538). Applicant submits that these claims are all allowable in view of the amendments to independent claims 1 and 11.

New claims 21-24 have been added to this application. New claim 21 is similar to original claim 1 and further includes the features that the adjustable mirror 110 is rotatably adjustable not only around an axis 113 but another axis perpendicular to the axis 113 by inclining a mirror body 112. In other words, the mirror is adjustable about two different axes. This claim is supported by the second paragraph on page 23 of the specification. //

New claim 22 is similar to original claim 1 and further includes the feature that the position sensor includes a 2-D position sensitive detector. This claim is supported by the third paragraph on page 14 of the specification.

New claim 23 is similar to original claim 1 and further includes the feature that the monitor display is detachable from the optical path system. This claim is supported by the second paragraph on page 11 of the specification.

New claim 24 is similar to original claim 1 and further includes the features of the first adjuster for adjusting an

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optical path of the first laser beam and the second adjuster for adjusting an optical path of the second laser beam and a monitor display for displaying the images corresponding to the relative positions of the first laser beam and the second laser beam on the position sensor.

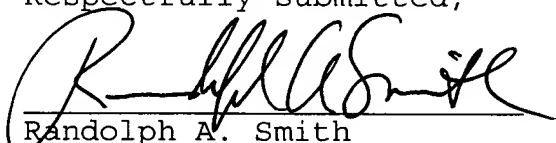
Applicant respectfully submits that these claims also define over the prior art of record and allowance of these claims is respectfully requested.

In summary, applicant respectfully submits that the application is now in condition for allowance and an action to this effect is respectfully requested.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

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Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Submitted herewith is a marked-up version of the amended claims to show changes made in the foregoing Amendment.

IN THE TITLE

The title have been amended as follows:

-- LASER BEAM SCANNER [AND PHOTOGRAPHIC PRINTER USING THE SAME] HAVING AN OPTICAL PATH ADJUSTMENT SYSTEM --.

IN THE CLAIMS

Claims 1 and 11 have been amended as follows:

-- 1. (Amended) A laser beam scanner comprising:
at least two laser light sources for oscillating and
emitting [at least two] a first laser beam and a second laser
[beams] beam having different [wavelength] wavelengths;
an optical scanning system for scanning the laser beams on a
predetermined scanning plane; and

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an optical path adjusting system for adjusting optical paths of the optical scanning system, including:

a position sensor disposed on a plane optically conjugated with the predetermined scanning plane, and [at least an adjuster for adjusting an optical path of a laser beam corresponding to the adjuster]

a first adjuster for adjusting an optical path of the first laser beam; and

a second adjuster for adjusting an optical path of the second laser beam. --

-- 11. (Amended) A photographic printer including a laser beam scanner, a conveyor for conveying a photographic paper to a predetermined scanning plane of the laser beam scanner and a developer for developing a latent image exposed on the photographic paper by the laser beam scanner; wherein the laser beam scanner comprising:

at least two laser light sources for oscillating and emitting [at least two] a first laser beam and a second laser [beams] beam having different [wavelength] wavelengths;

an optical scanning system for scanning the laser beams on the predetermined scanning plane; and

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an optical paths adjusting system for adjusting optical paths of the optical scanning system, including:

a position sensor disposed on a plane optically conjugated with the predetermined scanning plane, and [at least an adjuster for adjusting an optical path of a laser beam corresponding to the adjuster]

a first adjuster for adjusting an optical path of the first laser beam; and

a second adjuster for adjusting an optical path of the second laser beam. --